

Remarks

I. Status of claims

Claims 1-20 were pending.

Claims 2 and 13-20 have been canceled without prejudice.

Claims 21 and 22 have been added.

Therefore, claims 1, 3-12, 21, and 22 now are pending.

II. Claim rejections

A. Claims 1 and 5-12

The Examiner has rejected claims 1 and 5-12 under 35 U.S.C. § 103(a) over Parayanthal (U.S. 6,057,954) in view of Miller (U.S. 6,677,830) and Akiyama (U.S. 2003/0138179).

Independent claim 1 has been amended and now recites:

1. A device, comprising:

an input bonding pad and an output bonding pad each having a respective length less than one-quarter of a target wavelength corresponding to a target operating frequency, a respective characteristic impedance less than a target source impedance, and a respective reactive impedance that is capacitive up to at least the target operating frequency;

an input microstrip line and an output microstrip line each having a respective length less than one-quarter of the target wavelength, a respective characteristic impedance greater than the target source impedance, and a respective reactive impedance that is inductive up to at least the target operating frequency; and

an electro-absorption modulator having a signal electrode with a length less than one-quarter of the target wavelength, a characteristic impedance less than the target source impedance, and an equivalent circuit of a shunt capacitor at the target operating frequency;

wherein the input microstrip line is connected between the input bonding pad and the electro-absorption modulator, the output microstrip line is connected between the output bonding

pad and the electro-absorption modulator, and the input bonding pad, the output bonding pad, the input microstrip line, the output microstrip line, and the electro-absorption modulator have an equivalent circuit of a distributed low-pass filter transmission line circuit having a characteristic impedance matching the target source impedance at the target operating frequency.

None of the cited references teaches or suggests a device that includes "an input bonding pad and an output bonding pad each having ... a respective characteristic impedance less than a target source impedance," as now recited in claim 1.

In Parayanthal's optoelectronic device, the input bonding pad 212 is connected to the bonding wire 214, and the output bonding pad is connected between the bonding wire 216 and the load resistor 210. Parayanthal, however, does not teach or suggest anything about the characteristic impedance of the input and output bonding pads. In fact, throughout his disclosure Parayanthal ignores the electrical effects of the input and output bonding pads on the performance of his electro-absorption modulated laser (see, e.g., FIG. 3, in which the circuit diagram does not include shunt capacitances corresponding to the input and output bonding pads).

Miller's optoelectronic device does not include either an output bonding pad or an output microstrip line. Instead, in accordance with Miller's disclosure, the electroabsorption module 10 serves as the termination for the input RF signal.

Akiyama does not teach or suggest anything about input or output bonding pads. For example, in FIG. 8 Akiyama shows the micro-optical modulator elements 10A at the input and output ends of the optical modulator respectively connected directly to the signal source 12 and the termination load 11 without any intervening bonding pads.

Thus, none of the cited references teaches or suggests a device that includes "an input bonding pad and an output bonding pad each having ... a respective characteristic impedance less than a target source impedance," as now recited in claim 1. Accordingly, there is no combination of Parayanthal, Miller, and Akiyama that possibly could have led one skilled in the art at the time the invention was made to the inventive device recited in claim 1.

For at least these reasons, the Examiner's rejection of independent claim 1 under 35 U.S.C. § 103(a) over Parayanthal in view of Miller and Akiyama should be withdrawn.

Each of claims 5-12 incorporates the features of independent claim 1 and therefore is patentable over Parayanthal, Miller, and Akiyama for at least the same reasons.

B. Claim 3

The Examiner has rejected claim 3 under 35 U.S.C. § 103(a) over Parayanthal in view of Miller, Akiyama, and Mayer (U.S. 5,793,516).

Claim 2 incorporates the features of independent claim 1. Mayer does not make-up for the failure of Parayanthal, Miller, and Akiyama to teach or suggest the features discussed above in connection with independent claim 1. Indeed, Mayer does not teach or suggest that his optical modulator circuit includes “an input bonding pad and an output bonding pad each having ... a respective characteristic impedance less than a target source impedance,” as now recited in claim 1.

Therefore, claim 3 is patentable over Parayanthal, Miller, Akiyama, and Mayer for at least the same reasons explained above.

C. Claim 4

The Examiner has rejected claim 4 under 35 U.S.C. § 103(a) over Parayanthal in view of Miller, Akiyama, Mayer, and Nagra (U.S. 6,590,691).

Claim 4 incorporates the features of independent claim 1. Nagra does not make-up for the failure of Parayanthal, Akiyama, and Mayer to teach or suggest the features discussed above in connection with independent claims 1 and 13. Indeed, Nagra does not teach or suggest that his modulator chip 202 includes “an input bonding pad and an output bonding pad each having ... a respective characteristic impedance less than a target source impedance,” as now recited in claim 1. In fact, Nagra simply treats the entire modulator chip 202 as a single element that has an impedance Z_m (see FIG. 5, col. 7, line 58, through col. 8, line 2).

Therefore, claim 4 is patentable over Parayanthal, Miller, Akiyama, Mayer, and Nagra for at least the same reasons explained above.

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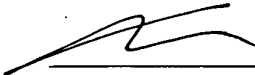
III. Conclusion

For the reasons explained above, all of the pending claims are now in condition for allowance and should be allowed.

Charge any excess fees or apply any credits to Deposit Account No. 50-1078.

Respectfully submitted,

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